



## OUR MEDICAL LITERATURE.

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WHEN I was surprised by the honour of an invitation to address this Congress, my first thought was that it must be declined, for the simple, but sufficient reason that I had nothing to say that would be worth occupying the time of such an assemblage as it was evident this would be. But while thinking over the matter, and looking absent-mindedly at a shelf of catalogues and a pile of new books and journals awaiting examination, it occurred to me that perhaps some facts connected with our medical literature, past and present, from the point of view of the reader, librarian, and bibliographer, rather than from that of the writer or practitioner, might be of sufficient interest to you to warrant an attempt to present them; and, the wish being probably father to the thought, I decided to make the trial.

When I say "Our Medical Literature," it is not with reference to that of any particular country or nation, but to that which is the common property of the educated physicians of the world as represented here to-day—the literature which forms the intra- and international bond of the medical profession of all civilized countries; and by virtue of which we, who have come here from the far West and the farther East, do not now meet, for the first time, as strangers, but as friends, having common interests, and though of many nations, a common language, and whose thoughts are perhaps better known to each other than to some of our nearest neighbours.

It is usual to estimate that about one-thirtieth part of the whole mass of the world's literature belongs to medicine and its allied sciences. This corresponds very well to the results obtained from an examination of bibliographies, and catalogues of the principal medical libraries. It appears from this that our medical literature now forms a little over 120,000 volumes properly so called, and about twice that number of pamphlets, and that this accumulation is now increasing at the rate of about 1,500 volumes and 2,500 pamphlets yearly.

Let us consider the character of this annual growth somewhat in detail, first giving some figures as the numbers of those who are producing it.

There are at the present time scattered over the earth about 180,000 medical men, who, by a liberal construction of the phrase, may be said to be educated; that is, who have some kind of a diploma; and for whose edification this current medical literature is produced. Of this number about 11,600 are producers of, or contributors to, this literature, being divided as follows: United States, 2,800; France and her Colonies, 2,600; the German Empire and Austro-Hungary, 2,300; Great Britain and her Colonies, 2,000; Italy, 600; Spain, 300; all others, 1,000. These figures should be considered in connection with the number of physicians

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in each country; but this I can only give approximately, as follows: United States 65,000; Great Britain and her Colonies, 35,000; Germany and Austro-Hungary, 32,000; France and her Colonies, 26,000; Italy, 10,000; Spain, 5,000; all others, 17,000.

It will be seen from these figures that the number of Physicians who are ✓ writers, is proportionately greatest in France and least in the United States. As ✓ regards France, this is largely due to the requirement of a printed thesis for graduation, which of itself adds between six and seven hundred annually to the number of writers.

Excluding popular medicine, pathies, pharmacy and dentistry, all of which were included in the figures for the annual product just given, we find that the ✓ contributions to medicine, properly so called, form a little over 1000 volumes and 1600 pamphlets yearly.

For 1879, Rupprecht's *Bibliotheca* gives as the total number of new medical books, excluding pamphlets, periodicals and transactions, 419; divided as follows, viz.: France, 187; Germany, 110; England, 43; Italy, 32; United States, 21; all others, 26. These figures are, however, too small, and especially so as regards Great Britain and the United States. The *Index Medicus* for the same year shows by analysis that the total number of medical books and pamphlets, excluding periodicals and transactions was 1643; divided as follows: France, 541; Germany, 364; United States, 310; Great Britain, 182; all others, 246. This does not include the inaugural theses, of which 693 were published in France alone.

The special characteristics of the literature of the present day are largely due to journals and transactions, and this is particularly true in medicine. Our periodicals contain the most recent observations, the most original matter, and are the truest representations of the living thought of the day, and of the tastes and wants of the great mass of the medical profession, a large part of whom, in fact, read very little else. They form about one-half of the current medical literature, and in the year 1879 amounted to 655 volumes, of which the United States produced 156; Germany, 129; France, 122; Great Britain, 54; Italy, 65; and Spain, 24. This is exclusive of journals of pharmacy, dentistry, &c., and of journals devoted to medical sects and isms. These are given in an appended table from which it appears that the total number of volumes of medical journals and transactions of all kinds was for the year 1879,—850 and for 1880,—864. The figures for 1880 are too small, but the real increase is slight. During the year 1879, the total number of original articles in medical journals and transactions which were thought worth noting for the *Index Medicus* was a little over 20,000. Of these there appeared in American periodicals 4781, in French, 4608; in German, 4027; in English, 3592; in Italian, 1210; in Spanish, 703; in all others, 1248. The figures for 1880 are about the same. It will be seen that at present more of this class of literature appears in the English language than in any other, and that the number of journal contributions is greatest in the United States. The actual bulk of periodical literature is, however, greatest in Germany, owing to the greater average length of the articles. With regard to the mode of publication, I will only say that in all countries except Spain, the greater number of medical periodicals are monthly, while in Spain they are semi-monthly. It is this periodical literature which, more than anything else, makes medicines cosmopolitan, and although as regards new discoveries or methods of treatment, it is still somewhat farther from London or Berlin or Paris to New York, than it is

from New York to either of these places, the discrepancy is gradually becoming less.

Many of the medical journals are very short lived, but the total number is increasing. In 1879, 23 such journals ceased, but 60 new ones appeared, and in 1880 there were 24 deaths and 78 births in this department of literature. Over one-third of this fluctuation occurs in the United States alone, France being next in the scale, Spain third and Italy fourth, while Great Britain is the most stable of all.

This merely quantitative classification gives of course no idea as to the character, and very little as to the value of the product. Let us now consider it by subjects. During 1879 there were published 167 books and pamphlets and 1543 articles relating to anatomy, physiology and pathology—that is, to the biological or scientific side of medicine. Dividing this again by nations, we find that Germany produced a majority of the whole, France being second. The proportionate production by nations of this class of literature is perhaps better shown by an analysis of the bibliography of physiological literature for the year 1879, as published by the *Journal of Physiology*. This shows 59 treatises and 500 articles in German, 17 treatises and 227 articles in French, 5 treatises and 77 articles from Great Britain, 8 treatises and 41 articles from Italy, and 2 treatises and 24 articles from the United States. The number of authors for this product was, German, 393, French, 119, English, 59, Italian, 39, United States, 19, all others, 41. For the year 1880 the same journal reports 62 treatises and 452 articles from Germany 23 treatises and 216 articles from France, 12 treatises and 76 articles from Great Britain, 4 treatises and 51 articles from Italy, 6 treatises and 25 articles from the United States, and 10 treatises and 31 articles from all other countries.\*

When we turn to the literature of the art, or practical side of the profession the figures are decidedly different. We find over 1200 treatises and 18,000 journal articles which come under this head, and the order of precedence of countries as to quantity is : France, United States, Germany, Great Britain, Italy and Spain. The appended tables give still further subdivisions, showing by nations the number of works and journal articles upon the practice of medicine, surgery, obstetrics, hygiene, etc., for the years 1879 and 1880, and some of the figures will be found interesting. A marked increase has occurred in the literature of hygiene during the last two years, and this especially in England, France, Germany and the United States. The literature of diseases of the nervous system of ophthalmology, otology, dermatology, and gynaecology, is also increasing more rapidly than that of the more general branches.

It would of course be extremely unscientific to use these figures as if they represented positively ascertained and comparable facts, the accuracy of which, as well as of the classification, could be verified. They represent merely the opinions of an individual—first as to whether each treatise or pamphlet included in these statistics was worth noting, and second as how it should be classed. Had everything been indexed the figures, for journal articles at least, might have been nearly doubled ; while if the selection had been made by a more severe critic they might have been reduced one-half.

\* The difference between these figures and those of the *Index Medicus*, is due, on the one hand, to the fact that the *Journal of Physiology* includes articles which are placed under other headings in the *Index Medicus*, and on the other hand, to the fact that the *Journal* has a different standard of excellence from that of the *Index*, rejecting many articles which the latter must accept as original,

If I had to do the work again I should not obtain the same results. The prevailing error is that, as regards journal articles, the figures are too large, for some of those included are of so little value or interest that they are, I fear, never read by more than two persons.

Be that as it may, I think we can take them as indicating certain differences in the direction of work of the medical authors of the great civilized nations of the earth; but they must be considered as approximations only; and the statistical axiom must be remembered that the results obtained from a large number of facts are applicable to an aggregate of similar facts but not to single cases. There will be a certain number of medical books and papers printed next year, just as there will be a certain number of children born;—and as we can within certain limits predict the number of these births and the proportion of the sexes, or even of monsters;—so we can within certain limits predict the amount and character of literature that is yet to come, the ideas that are yet unborn. The differences are due to race, political organization, and density of population. As Dr. Chadwick has pointed out, in speaking of the statistics of obstetric literature, one of the chief causes of the multiplication of medical societies is geographical. "In England it is possible for those who are specially interested in gynaecology and obstetrics to attend the meetings of the Obstetrical Society of London, whereas in America the distances are so great that this is impossible." Speaking broadly we may say that at present Germany leads in scientific medicine both in quantity and quality of product, and that the rising generation of physicians are learning German physiology. But the seed has gone abroad and scientific work is receiving more and more appreciation everywhere.

Seven years ago Professor Huxley declared that if a student in his own branch showed power and originality he dared not advise him to adopt a scientific career, for he could not give him the assurance that any amount of proficiency in the biological sciences would be convertible into the most modest bread and cheese. To-day I think he might be bolder, for such a fear would hardly be justifiable; at all events, in America; where such a man as is referred to could almost certainly find a place, bearing in mind the Professor's remark that it is no impediment to an original investigator to have to devote a moderate portion of his time to giving instruction either in the laboratory or in the lecture room.

Within the last ten years the literature of France, Germany, Great Britain, and the United States has contained much with regard to medical education and the means for its improvement. In all these countries there is more or less dissatisfaction with the existing condition of things, although there is no general agreement as to the remedy. Solomon's question, "Wherefore is there a price in the hands of a fool to get wisdom, seeing he hath no heart to it?" is now easily answered, for even a fool knows that he must have the semblance of wisdom, and a diploma to imply it, if he is to succeed in the practice of medicine; but to ensure the value of a diploma as a proof of education is the difficulty.

This evidence of discontent and tendency to change is a good sign. In these matters stillness means sleep or death—and the fact that a stream is continually changing its bed shows that its course lies through fertile alluvium and not through sterile lava or granite.

I have said that as regards scientific medicine we are at present going to school to Germany. This, however, is not the case with regard to therapeutics either external or internal,—in regard to which I presume that the physicians of each nation are satisfied as to their own pre-eminence. At all events it is true that,

for the treatment of the common diseases, a physician can obtain his most valuable instruction in his own country ; among those whom he is to treat. Just as each individual is in some respects peculiar and unique, so that even the arrangement of the minute ridges and furrows at the end of his forefinger differs from that of all other forefingers, and is sufficient to identify him ; and as the members of certain families require special care to guard against haemorrhage, or insanity, or phthisis ; so it is with nations and races. The experienced military surgeon knows this well, and in the United States, which is now the great mixing ground, illustrations of race peculiarities are familiar to every practitioner.

Neither the tendency nor the true value of this current medical literature can be properly estimated by attending to it alone. It is a part of the thought of the age—of that wonderful kaleidoscopic pattern which is unrolling before us, and must be judged in connection with it. From several sources of high authority there have come of late years warnings and laments that science is becoming too utilitarian. For example, Prof. Du Bois-Reymond in his address upon civilization and science, says that that side of science which is connected with the useful arts is steadily becoming more prominent, each generation being more and more bent on material interests. "Amid the unrest which possesses the civilized world men's minds live as it were from hand to mouth. \* \* \* And if industry receives its impulse from science it also has a tendency to destroy science. In short, idealism is succumbing in the struggle with realism and the kingdom of material interests is coming." Having laid down this rather pessimistic platform, he goes on to state that this is especially the case in America which is the principal home of utilitarianism, and that it has become the custom to characterize as "Americanization" the dreaded permeation of European civilization by realism. If this characterization be correct it would seem that Europe is pretty thoroughly Americanized as regards attention to material interests and appreciation of practical results. But the truth of the picture seems to me doubtful. Science is becoming popular, even fashionable, and some of its votaries rival the devotees of modern *Aestheticism* in their dislike and fear of the sunlight of comprehensibility and common sense. The languid scientific swell who thinks it bad style to be practical, who takes no interest in any thing but pure science, and makes it a point to refrain from any investigations which might lead to useful results lest he might be confounded with mere "practical men" or "inventors," exists and has his admirers. We have such in medicine, and their number will increase.

The separation of biological study from practical medicine, which has of late years become quite marked in the literature of the subject, has its advantages and disadvantages. Thus far the former have far outweighed the latter, and both the science and the art of medicine have been promoted thereby. But are not the physiologists, or as I believe they prefer to be called, the biologists, separating themselves too completely from medicine for the best interests of their own science, in that they are neglecting human pathology ? In our hospital wards and among our patients, nature is continually performing experiments which the most dexterous operator cannot copy in the laboratory—she is, as Professor Foster says, "a relentless and untrammelled vivisector, and there is no secret of the living frame which she has not, or will not, at some time or place, lay bare in misery and pain."

Now while it is true that Professor Foster, in his address before the British Medical Association last year, (which address is the clearest exposition of the

aims of the physiology of the present day that I have seen) insists upon the fact that all distinctions between physiology and pathology are fictitious; and declares that attempts to divide them are like attempts to divide meteorology into a science of good and a science of bad weather, his conclusion that the pathologist should be trained in methods of physiological investigation seems to me to be only a part of the truth. The tacit assumption is that all, or at least the most important, phenomena of human disease may be reproduced in the physiological laboratory. If this were only true, what a tremendous stride would have been taken towards making medicine a science. Unfortunately it is not so. Many of the most interesting of these phenomena—the most interesting because as yet the most unexplainable—can only be observed in the sick man himself. Nor have the physiologists as yet made much use of that field which ought to be specially inviting to them—namely: comparative pathology; although the literature of the present time already indicates that a change has begun in this respect.

While it is true that to the graduate of thirty years ago much of the physiological literature of the present day is in an unknown tongue, it is also true that the physiologist of the present, who confines himself to laboratory work, will find himself distanced by the man who keeps his clinical and pathological studies and his experimental work well abreast.

The increase in both the amount and value of the literature of the several specialities in medicine is readily seen by a comparison of recent catalogues and bibliographies with those of twenty or thirty years ago, and this increase still continues at a greater rate than prevails in the more general branches. There are great differences of opinion as to the relative value of this increase and as to its future effect upon the profession, but there can be no doubt as to the fact. There must be specialities and specialists in medicine, and the results will be both good and evil; but the evils fall largely upon those specialists who have an insufficient general education,—who attempt to construct the pyramid of their knowledge with the small end as a foundation. It has been said by Dr. Hodgen that “in medicine a specialist should be a skilled physician and something more, but that he is often something else—and something less.” There is truth in this: truth which the young man will do well to consider with care before he begins to specialize his studies; but on the other hand it is also true that the great majority of men must limit their field of work very much and very clearly if they hope to achieve success. The tool must have an edge if it is to cut. It is by the labour of specialists that many of the new channels for thought and research have been opened, and if the flood has sometimes seemed to spread too far, and to lose itself in shallow and sandy places, it has nevertheless tended to fertilize them in the end.

The specialists are not only making the principal advances in science but they are furnishing both strong incentives and valuable assistance towards the collection and preservation of medical literature and the formation of large public libraries.

Burton declares that a great library cannot be improvised, not even if one had the national debt to do it with—thinks that 20,000 volumes is about the limit of what a miscellaneous collection can bring together, and refers especially to the difficulty in creating large public libraries in America. My experience would show that these statements do not apply to medical books. Of these the folios and quartos of three and four hundred years ago seem to have had great capacity for resistance to ordinary destructive forces. Perhaps much of this is due to the

fact that they are not usually injured by too much handling or perusal. True, they are gradually becoming rarer, but at the same time by means of properly organized libraries they are becoming more accessible to all who wish to really use them, and not merely to collect and hide them away. They drift about like the sea weed, but the survivors are gradually finding secure and permanent resting-places in the score of great collections of such literature which the world now possesses. At present the currents of trade are carrying them in relatively large numbers to the United States, where medical collectors and specialists are among the best customers of the antiquarian booksellers of Europe. I could name a dozen American physicians who have given to European agents almost unlimited orders for books relating to their several specialities, and upon their shelves may be found books of the 15th and 16th centuries, which may be properly marked as "rarissime."

Not that the rarest books are by any means the oldest. The collector who seeks to ornament his shelves with the "Rose of John of Gaddesden," or the "Lily of Bernard de Gordon," the first folios of "Avicenna" or "Celsus," or almost any of the eight hundred medical incunabulae described by Hain, will probably succeed in his quest quite as soon as the one who has set his heart on the first editions of Harvey or Jenner, the American tracts on inoculation for small-pox, or complete sets of many of the journals and transactions of the present century.

Whatever may be the chosen line of the book collector, he is the special helper of the public library, and this whether he intend it or not. In most cases his treasures pass through the auction room, and sooner or later the librarian, who can afford to wait, will secure them from further travel. Thanks to the labours of such collectors, I think it is safe to say,—what certainly would not have been true twenty years ago,—that if the entire medical literature of the world with the exception of that which is collected in the United States, were to be now destroyed, nearly all of it that is valuable could be reproduced without difficulty.

What is to be the result of this steadily increasing production of books? What will the libraries and catalogues and bibliographies of a thousand, or even of a hundred years hence be like, if we are thus to go on in the ratio of geometric progression, which has governed the press for the last few decades? The mathematical formula which would express this, based on the data of the past century, gives an absurd and impossible conclusion, for it shows that if we go on as we have been going there is coming a time when our libraries will become large cities, and when it will require the services of every one in the world, not engaged in writing, to catalogue and care for the annual product. The truth is, however, that the ratio has changed, and that the rate of increase is becoming smaller. In western Europe, which is now the great centre of literary production, it does not seem probable that the number of writers or readers will materially increase in the future, and it is in America, Russia, and southern Asia, that the greatest difference will be found between the present amount of annual literary product and that of a century hence.

The analogies between the mental and physical development of an individual, and of a nation or society, have been often set forth and commented on, but there is one point where the analogy fails as regards the products of mental activity,—and that is that as yet we have devised no process for getting rid of the exuviae. Growth and development in the physical world imply the changes of death as well as of life—that with the increase of the living tissues there shall also be the excretion and destruction of dead, outgrown and useless matters which have had

their day and served their purpose. But *litera scripta manet*. There is a vast amount of this effete and worthless material in the literature of medicine, and it is increasing rapidly. Our literature is in fact something like the inheritance of the golden dustman, but with this important difference, viz: that when the children raked a few shells or bits of bone from the dust-man's heap,—and, after stringing them together and playing with them a little while, threw them back,—they did not thereby add to the bulk of the pile,—whereas our preparers of compilations and compendiums, big and little, acknowledged or not, are continually increasing the collection, and for the most part with material which has been characterized as "superlatively middling, the quintessential extract of mediocrity." A large medical library is in itself discouraging to many inquirers, and I have become quite familiar with the peculiar expression of mingled surprise, awe and despair which is apt to steal over the face of one not accustomed to such work when he first finds himself fairly in the presence of the mass of material which he wishes to examine for the purpose of completing his ideal bibliography of,—let us say epilepsy,—or excisions,—or the functions of the liver.

Let such enquirers, as well as those who regret that they have no access to large libraries, and must therefore rely on the common text books and current periodicals for bibliography, console themselves with the reflection that much the larger part of all of our literature which has any practical value belongs to the present century, and indeed will be found in the publications of the last 20 years.

There are a few books written prior to 1800 which every well educated medical man should,—I will not say read but—dip into, such as some of the works of Hippocrates and Galen, of Harvey and Hunter, of Morgagni and Sydenham—but this is to be done to learn their methods and style rather than their facts or theories, and by the great majority of physicians it can be done with much more profit in modern translations than in the originals. The really valuable part of the observations of these old masters has long ago become a part of the common stock, and the results are to be found in every text book.

If, perchance, among the dusty folios there are stray golden grains yet un gleaned, remember that just in front are whole fields waiting the reaper. There is not, and has not been any lack of men who have the taste and time to search the records of the past, and the man who has opportunities to make experiments or observations for himself wastes his time, to a certain extent, if he tries to do bibliographical work so long as he can get it done for him. He wishes to know whether this problem has been attacked before, and with what result—whether there are accounts of any other cases like the one he has in hand. In ninety-nine instances out of a hundred if the answer to these questions is not given in the current text books or monographs it is not worth prolonged search by the original investigator. Yet he should know how to make this search, if only to enable him to direct others, and it is for this reason that a little acquaintance with bibliographical methods of work ought to be obtained by the student.

When a physician has observed or (thinks he has observed) a fact, or has evolved from his inner consciousness a theory which he wishes to examine by the light of medical literature, he is often very much at a loss to know how to begin, even when he has a large library accessible for the purpose.

The information he desires may be in the volume next his hand, but how is he to know that? And even when the usual subject-catalogue is placed before him he finds it very difficult to use it, especially when, as is often the case, he has by no means a well defined idea as to what it is he wishes to look for. Upon the

title page of the Washington City Directory is printed the following aphorism, "To find a name you must know how to spell it." This has a very extensive application in medical bibliography. To find accounts of cases similar to your own rare case you must know what your own case is.

To return to the Subject-Catalogue. If it is a classed catalogue, a catalogue raisonnée—it will often seem to be a very blind guide to one who is not familiar with the classification and nomenclature adopted by the compiler. And certainly some of these classifications are very curious—reminding one of Heine's division of ideas into reasonable ideas, unreasonable ideas, and ideas covered with green leather. But if the enquirer has mastered the arrangement of the catalogue it is two to one that it will not help him. It is a catalogue of the titles of books, but very often the title of a book gives very little information as to its contents, if indeed it is not actually misleading. Now suppose the particular case he has in hand is one of a new-born infant having one leg much larger and longer than the other. He will find no book title relating to this. There may be a book in the library on diseases of the lymphatics which contains just what he wants, but unless he knows that his case is one affecting the lymphatics he will hardly get the clue. There may also be in the library twenty papers, in as many different volumes of journals and transactions, the titles of which show that they probably relate to similar cases, but the titles of such papers do not appear in the catalogue.

It should also be observed that Subject-Catalogues may easily be put to improper uses, or thought to give more information than they really do. They are not bibliographies, but mechanical aids in bibliographical work.

You will, perhaps, pardon me for taking as an illustration the Index Catalogue of the library of the Surgeon-General's office in Washington, as being one with which I am familiar, and which I can venture to comment on without risk of its being thought that I wish to depreciate its value. Taking any given subject in medicine, it is possible for a fairly educated physician to obtain from this catalogue a large proportion of all the references which have any special value, and by so doing to save a vast amount of time and labour. On the other hand, he will find when he comes to examine the books and articles referred to, that at least one-half of them are of no value so long as the other half are accessible, seeing that they are dilutions and dilatations, re-hashes and summaries of the really original papers. If the seeker is in the library itself, this does not cause a great waste of time, as he can rapidly examine and lay aside those that do not serve his purpose. But if he is using this catalogue in another library—say here in London, the case is different. It is highly improbable that he will find in any other collection all the books referred to, and then comes the annoyance of the doubt as to whether he may not be missing some very valuable paper. How is he to know whether or not Smith, in his pamphlet on the functions of the pneumogastric, has anticipated his own theory of its relations to enlarged tonsils? And in all such cases "*omne ignotum est pro magnifico.*" In a bibliography of the subject, prepared from the same material as the catalogue, he would either find no mention of Smith's paper, or, better still, a note that his paper is merely an abstract, or compilation. The fact that he does not find Smith's book in the London library, nor any allusion to it in the best works on the subject, ought to induce him to ignore it altogether.

In proportion to the energy of the young writer, and his determination to not only note everything that has been written about his subject, but to carry out the

golden rule of verifying all his references, he is apt to be led off from his direct research into the many attractive by-paths of quaint and curious speculation which he will find branching off on every side, and this danger must be guarded against, or he will find that he is wasting his time and energy in turning over chaff which has long ago been pretty thoroughly threshed and winnowed.

It is, however, no part of my present purpose to set forth the methods and principles of bibliography; it is sufficient to point out their importance, and to call attention to the point that a knowledge of how and where to find the record of a fact is often of more practical use than a knowledge of the fact itself, just as we value an encyclopædia for occasional reference, and not for the purpose of reading through from cover to cover.

Instruction in the history and literature of medicine forms no part of the course of medical education in English and American schools; nor should I be disposed to recommend its introduction into the curriculum if it were to be based on French and German models but it does seem possible to take a step in this direction which would be of great value, not only as a means of general culture, as teaching students how to think, but from a purely practical point of view, in teaching them how to use the implements of their profession to the best advantage—for books are properly compared to tools of which the index is the handle. Such instruction should be given in a library, just as chemistry should be taught in a laboratory. The way to learn history and bibliography is to make them—the best work of the instructor is to show his students how to make them.

In the absence of some instruction of this kind the student is liable to waste much time in bibliographical research. There has been much more done in this direction than many writers seem to suppose, and there are not many subjects in medicine which have not been treated from this point of view. Of course all is not bibliography which pretends to be such. Very many of the exhaustive and exhausting lists of references which are now so common in medical journal articles have been taken largely at second-hand, and thereby originate or perpetuate errors. It is well to avoid false pride in this matter. To overlook a reference is by no means discreditable,—but a wrong reference, or an unwitting reference to the same thing twice, gives a strong presumption of carelessness and second-hand work. Journal articles, however, and especially reports of cases, undergo strange transmogrifications sometimes, and I have watched this with interest in the case of a French or German paper, translated and condensed in the London Record, then appearing in abstract under the name of the translator in a leading journal, then translated again, with a few new circumstances, in a continental periodical, and finally perhaps reversed and appearing as an original contribution in the pages of the "Little Paddington Medical Universe."

In this connection it is well to remember that a mere accumulation of observations, no matter how great the number, does not constitute science, especially if these observations have been recorded under the influence of the same theories and in essentially similar conditions.

Science seeks the law which governs or explains the phenomena, and when this is found the records of isolated instances of its action usually become of small importance so far as that law is concerned. We care little now for the records of the chemical experiments of a century ago, and the many detailed accounts of the earlier cases of the use of ether or chloroform are of so little interest at the present time that it is not worth while to refer to them in a bibliography of the subject. And although much has been done towards classifying

and indexing our medical records (more in fact than most physicians suppose still, as Helmholtz points out, such knowledge as this hardly deserves the name of science, since it neither enables us to see the complete connection nor to predict the result under new conditions yet untried.

Do I seem to deprecate the value of the thoughts which our masters have left us, and which have furnished the foundations on which we build?—or to undervalue the importance of the great medical libraries in which are stored these thoughts?—or to speak slightly of the utility of the catalogues, and indexes, and bibliographies, without which such libraries are trackless and howling wildernesses? If so, I have said what I did not mean to say. The subject has been considered from the point of view of what used to be called the division of labour, but which now I suppose should be called evolution and differentiation, and this has been done because life is short and the art is long,—with fair prospect of becoming longer. It is surely unnecessary for me to enter upon any panegyric of books or libraries. As Dr. Holmes says: "It is not necessary to maintain the direct practical utility of all kinds of learning. Our shelves contain many books which only a certain class of medical scholars will be likely to consult. There is a dead medical literature, and there is a live one. The dead is not all ancient, the live is not all modern. There is none, modern or ancient, which, if it has no living value for the student, will not teach him something by its autopsy. But it is with the live literature of his profession that the medical practitioner is first of all concerned."

In medicine, as in social science, we must depend for many facts upon the observation of conditions which occur very rarely, and which cannot be repeated at pleasure. I have already alluded to the importance of Nature's vivisections to the physiologist, and a record of a case written a century ago may be just the link that is needed to correlate the results of his experiments of yesterday with existing theories. The case, which at first seems unique and inexplicable, both receives and furnishes light when compared with ancient records.

A science of medicine, like other sciences, must depend upon the classification of facts, upon the comparison of cases alike in many respects, but differing somewhat either in their phenomena or in the environment. The great obstacle to the development of a science of medicine is the difficulty in ascertaining what cases are sufficiently similar to be comparable—which difficulty is in its turn largely due to insufficient and erroneous records of the phenomena observed. This defect in the records is largely due—first, to ignorance on the part of observers; second, to the want of proper means for precisely recording the phenomena; and third, to the confused and faulty condition of our nomenclature and nosological classification.

Let us consider each of these points briefly. Very, very few are the men who can, by and for themselves, see and describe the things that are before them. Just as it took thousands of years to produce a man who could see what now any one can see when shown him, that the star Alpha in Capricorn is really two separate stars, so we had to wait long before the man came who could see the difference between measles and scarlatina, and still longer for the one who could distinguish between typhus and typhoid. Said Plato, "He shall be as a god to me, who can rightly divide and define." Men who have this faculty—the "Blick" of the Germans—we cannot produce directly by any system of education; they come we know not when or why, "forming a small band, a mere understanding of whose thoughts and works is a test of our highest powers. A single English

dramatist, and a single English mathematician have probably equalled in scope and excellence of original work in their several fields all the like labours of their countrymen put together.”\*

But cannot we do something to increase the number of observers by telling them what to observe? It is probable that much may be accomplished in this direction provided that care be taken to limit the field. Manuals of “what to observe at the bedside and in the post-mortem room” are very well in their way, but can never be made to reach the great majority of the profession, nor would they be of much use if they did. If a few, a very few, distinct specific questions are brought to the attention of the general practitioner, he will often be on the alert for their answer. And it should be remembered that chance may present to the most obscure practitioner an opportunity for observation which the greatest master may never meet.

The great difficulty is to get such questions prepared. They must relate to matters that are just in the nebulous region between the known and unknown—to points not yet clear, but of which we know enough to make it probable that by observing in a definite direction they can be made clear; and to prepare them requires not only knowledge, but a certain reaching out beyond knowledge. It usually happens that the man who has this faculty strives to answer his questions himself; and no doubt he can usually do it better than another. But much can be done towards defining and marking out what we do not know, and this has been a powerful aid to the progress of physiology in recent years.

I have had occasion to refer to this in speaking of Professor Forster’s work on physiology, in each section of which an attempt is made to separate that which may be considered as proved from that which is merely probable; and thus almost every page becomes suggestive of work to be done.

Another example of what I mean will be found in a paper on the collection of data at autopsies by Professor H. P. Bowditch of Boston (*Trans. Mass. Med. Legal Soc.* 1, 1880, p. 139). Taking the results of an investigation into the absolute and relative size of organs at different periods of life, and in connection with different morbid tendencies, recently published by Professor Beneke of Warburg—Dr. Bowditch urges the securing as large a number as possible of such data, and selects certain of Professor Beneke’s results for special inquiry; as for instance that “the cancerous diathesis is associated with a large and powerful heart, capacious arteries, but a relatively small pulmonary artery, small lungs well developed bones and muscles, and tolerably abundant adipose tissue.” It can hardly be doubted that those who read the papers of Professors Bowditch and Beneke will be induced to examine things which before would have had for them no interest, and therefore to make and record observations in pathological anatomy which otherwise would have been lost.

The second difficulty referred to—viz.: the want of means for making accurate records, is one that is yearly growing less. It behoves us to be modest in our predictions as to what may be accomplished in the future towards the solution of our Sphynx’s riddle. We see as through a glass darkly, and except through the glass, in no wise; but at least we have made such progress that what we do see, we can to a great extent so record that our successors yet unborn can also see—and it is owing to this fact that a part of the medical literature of the last quarter of a 19th century will be more valuable than all that has preceded it.

\* Iles, Mathematics in Evolution. *Pop. Sci. Monthly*, 1876, IX. p. 207.

The word-pictures of disease traced by Hippocrates and Sydenham, or even those of Graves and Trousseau, interesting and valuable as they are, are not comparable with the records upon which the skilled clinical teacher of the present day relies. Yet how imperfect in many cases are even the best of these records as compared with what might be given with the resources which we have at our command. The temperature chart has done away with the errors which necessarily follow attempts to compare the memory of sensations perceived last week with the sensations of to-day—and the balance and the burette enable us to estimate with some approach to precision the tissue changes of our patients by the records of change in the excretions which they furnish; but we must still trust to our memory, or to the imperfect descriptions of what others remember, when we attempt to compare the results obtained on successive days by auscultation or percussion, although the phonograph and microphone strongly hint to us the possibility of either accurately reproducing the sounds of yesterday, or of translating them into visible signs, perhaps something like the dot and dash record of the telegraph code, which could then be given to the press, and so compared with each other by readers at the Antipodes.

We are beginning to count the blood corpuscles, and to use photomicrography, but we do not yet apply the latter process to the former so as to enable every reader to count for himself.

The connections of medicine with the physical sciences are yearly becoming closer, and the methods by which these sciences have been brought to their present condition are those by which progress has been, and is to be, made in therapeutics as well as in diagnosis or in physiological research. These methods turn mainly upon increasing the delicacy and accuracy of measurements: of expressing manifestations of force in terms of another force, or of dimension in space or time. The balance and the galvanometer, the microscope and the pendulum, the camera, the sphygmograph and the thermometer are some of the means by which investigators, at the bedside and in the laboratory, are seeking to obtain records which shall be independent of their own sensations or personal equations; which shall be taken and used as expressing not opinions but facts; and with every addition to or improvement in these means of measurement and record, the field of observation widens, and new and more reliable materials are furnished for the application of logical and mathematical methods.

Upon the third difficulty which has been referred to,—viz: our confused and defective terminology I need not dwell. “Science,” said Condillac, “is a language well made,” and though this is far from being the whole truth, it is an important part of it. In examining medical reports and statistics, it is necessary to bear constantly in mind that to understand many terms you must know what the individual writer means by them. When, for example, we find in such statistics a certain number of deaths attributed to gastro-enteritis, or croup, or scrofula, we have to take into account the country, the period and the individual author in order to get even a fair presumption as to what is meant.

The three difficulties which have been referred to, although the most important, are by no means the only causes of the confusion and imperfection of our records.

Prominent among the minor troubles of the investigator are defective or misleading titles;—and in behalf of the readers and bibliographers of the future I would appeal to authors, and more especially to editors, to pay more attention than many of them do to the matter of titles and indexes. The men to whom

your papers are most important, and who will make the best use of them provided they knew of their existence, are for the most part hard workers, busy men, who have a right to demand that their literary table shall be provided with properly prepared materials and not with shapeless lumps.

The editors of transactions of societies, whether these are sent to journals, or published in separate form, often commit numerous sins of omission in the matter of titles. |The rule should be that every article which is worth printing is worth a distinct title, which should be as concise as a telegram, and be printed in a special type. If the author does not furnish such a title it is the editors business to make it, and he should not be satisfied with such headings as "Clinical Cases," "Difficult Labour," "A Remarkable Tumour," "Case of Wound, with Remarks." The four rules for the preparation of an article for a journal will then be: 1. Have something to say; 2. Say it; 3. Stop as soon as you have said it; 4. Give the paper a proper title.

Some societies and editors do not seem to appreciate fully their responsibility for the articles which they accept for publication, a responsibility which cannot be altogether avoided by any formal declaration disclaiming it. This is due to the fact that while the merits of a paper can usually be determined by examination, this is by no means always the case. In every country there are writers and speakers whose statements are received with very great distrust by those best acquainted with them. Supposing these statements to be true, the papers would be of much interest and importance; but the editor should remember that a certain number of readers, and especially those in foreign countries, have no clue to the character of the author, beyond the fact that they find his works in good company. |In medical literature, as in other departments, we find books and papers from men who are either constitutionally incapable of telling the simple literal truth as to their observations and experiments, although they may not write with fixed intention to deceive, or from men who seek to advertise themselves by deliberate falsehoods as to the results of their practice. Such men are usually appreciated at their true value in their immediate neighbourhood, and find it necessary to send their communications to distant journals and societies in order to secure publication. |

I presume that you are all familiar with the peculiar feeling of distrust which is roused by too complete an explanation. The report of a case in which every symptom observed, and the effect of every remedy given, is fully accounted for, and in which no residual unexplained phenomena appear, is usually suspicious, for it implies either superficial observation, or suppression, or distortion of some of the facts. A diagrammatic representation is usually much plainer than a good photograph, but also of much less value as a basis for further work.

No fact is more familiar to this audience than the vast extent of the field of the science of to-day—so vast that few may hope to master more than a small part of it, and yet so closely connected that even the small part cannot be fully grasped without some acquaintance with a much wider field.

But little over a hundred years ago, Haller in Göttingen was professor of anatomy, botany, physiology, surgery, and obstetrics, and lecturer on medical jurisprudence. At the same time he was writing one review a week, and summing up existing medical science in his *bibliothecæ*. To-day any one of these branches requires all the time of the most energetic and learned of our contemporaries; but, on the other hand, the well-educated medical graduate of to-day could give Haller valuable instruction in each of the branches of which he was professor.

It is also true, as I have pointed out, that our actual progress is by no means in proportion to the work done, nor as great as these merely quantitative statements would seem to make it.

Science has been termed "the topography of ignorance." "From a few elevated points we triangulate vast spaces, enclosing infinite unknown details. We cast the lead and draw up a little sand from abysses we shall never reach with our dredges. If it is true that we understand ourselves but imperfectly in health, it is more signally manifest in disease, where natural actions imperfectly understood, disturbed in an obscure way by half seen causes, are creeping and winding along in the dark toward their destined issue, sometimes using our remedies as safe stepping stones, occasionally, it may be, stumbling over them as obstacles."\*

In days of old, when the profession of medicine, or of a single medical specialty was an inheritance in certain families, a large part of their knowledge, and the efficiency of their remedies was thought to depend upon these being kept a profound mystery. Among the precepts of magic there was no more significant one than that which declared that the communication of the formula destroyed its power, and that hence attempts to reveal the secret must always fail. We have changed all that. Every physician hastens to publish his discoveries and special knowledge, and a good many do the same by that which is not special, or which is not knowledge. For the individual, in a degree—for the nation or the race in a much greater degree—the literature produced is the most enduring memorial. The whole result of civilization has been cynically defined as being roughly, "Three hundred million Chinese, two hundred million natives of India, two hundred million Europeans and North Americans, and a miscellaneous hundred million or two of Central Asians, Malays, South Sea Islanders, &c., and over and above all the rest the Library of the British Museum. This is the net result of an indefinitely long struggle between the forces of men and the weights of various kinds in the attempt to move which these forces display themselves."†

And thus in our great medical libraries each of the folios or quaint little black letter pamphlets which mark the first two centuries of printing, or of the cheap and dirty volumes of more modern days with their scrofulous paper and abominable typography, represents to a great extent the life of one of our profession and the fruit of his labours, and it is by the fruit that we know him.

After stating that modern physicists have concluded that the sun is going out, that the earth is falling into the sun, and therefore that it and all things in it will be either fried or frozen, Professor Clifford concludes that "our interest lies so much with the past as may serve to guide our actions in the present, and with so much of the future as we may hope will be affected by our actions now. Beyond that we do not know and ought not to care. Does this seem to say let us eat and drink for tomorrow we die? Not so, but rather let us take hands and help for this day we are alive together." To this I join a verse from the Talmud which will remind you of the first aphorism of Hippocrates, and is none the worse for that. "The day is short, and work is great,—the reward is also great, and the master presses. It is not incumbent on thee to complete the work, but thou must not therefore cease from it.

\* "Border Lines of Knowledge," etc., by O. W. Holmes, Boston, 1862, pp. 7-8.

† "Liberty, Equality and Fraternity," by James Fitz James Stephen, N.Y., 1873, p. 178.

TABLE I.

*The Number of Volumes of Medical Journals and Transactions Published in the Years  
1879 and 1880.*

Subjects.	Journals and Transactions.	United States.	Gt. Brit. and Colonies.	France & Colonies.	Germany	Spain.	Italy.	All Others.	Total.								
		1879	1880	1879	1880	1879	1880	1879	1880	1879	1880						
General and Miscellaneous, Practical Medicine, etc.	Journals ... ... Transactions ...	75 50	83 54	26 11	26 12	60 30	63 19	41 31	43 31	22 1	26 1	42 9	42 7	70 31	72 27	336 169	355 151
Anatomy, Physiology, Morphology, Biology.	Journals ... ... Transactions ...	1	1	4	4	5 4	5 2	15	17	1	1	1	26 5	27 3			
Diseases of Nervous System and Insanity.	Journals ... ... Transactions ...	3	5	4	4	2 1	3	5	5	3	4	17 1	21				
Surgery.	Journals ... ... Transactions ...		1			1	1	1	3	3		3 2	4 2				
Ophthalmology.	Journals ... ... Transactions ...	1	1	1	2	4	4	5 3	5 1	3	3	2 2	19 2	20 1			
Skin Diseases.	Journals ... ... Transactions ...	1 1	1 1	1	1	1	1	1	1	1	1	5 1	5 1				
Otology.	Journals ... ... Transactions ...	2 1	2			1	1	3	3			6 1	6				
Gynaecology and Obstetrics.	Journals ... ... Transactions ...	2 3	2 1	1 2	1 1	5	7	6	6	1	2	18 5	20 2				
Hygiene and Medical Jurisprudence.	Journals ... ... Transactions ...	6 3	6 3	2 2	3 4	5 3	5 2	13 4	13 3	1	3	4 1	6 1	36 13	40 13		
Pharmacy and Medical Chemistry.	Journals ... ... Transactions ...	7 4	9 3	7	6	5 3	5 1	15 1	15 1	5	5	5 5	9 8	53 4	54		
Dentistry.	Journals ... ... Transactions ...	6	10			2	2	2	3					10	15		
Homœopathy.	Journals ... ... Transactions ...	12 3	16 3	4	4	3 2	3 1	7	7	1	1	3	2	5	33 5	36 4	
Ecclectic, Botanic, Physio-Medical, etc.	Journals ... ... Transactions ...	11 2	13 2											11 2	13 2		
Popular, Advertising, Mineral Waters, etc.	Journals ... ... Transactions ...	8	10	4	4	12 1	8 1	5	5	2	2	2	2	2	35 1	33 1	
Veterinary.	Journals ... ... Transactions ...	1	3	3	3	4	4	11	10		4	5	4	4	27	29	
Laryngology.	Journals ... ... Transactions ...		1				1								2	1	
Total ....	Journals ... ... Transactions ...	135 74	163 69	57 15	58 17	109 45	112 27	132 38	136 36	36 1	40 1	69 10	70 7	97 32	101 28	635 215	680 184

TABLE II.

*The Medical Literature of 1879 and 1880.*

Subjects.	No. of	United States.		England.		France.		Germany.		Italy.		Spain.		Others.		Total.	
		1879	1880	1879	1880	1879	1880	1879	1880	1879	1880	1879	1880	1879	1880	1879	1880
Anatomy and Physiology.	Books ...	7	17	19	18	60	32	54	31	5	2	1	1	26	8	172	106
	Theses ...					25	24	4						6	29	30	
	Jour. Articles ...	162	177	157	176	385	351	458	420	109	105	26	32	74	68	1371	1329
Pathology.	Books ...	2	3	2	13	5	7	6								22	16
	Theses ...				11	7	3	1						2	1	16	9
	Jour. Articles ...	32	32	25	27	36	51	35	56	13	12	5	5	12	19	158	202
Practice of Medicine.	Books ...	52	27	39	51	132	104	78	56	7	12	9	2	55	12	372	264
	Theses ...				248	210	7	12						2	7	257	235
	Jour. Articles ...	1454	1154	1085	918	1340	1050	1001	812	316	257	198	171	405	348	5799	4716
Diseases of Nervous System.	Books ...	38	32	19	30	33	48	32	23	1	4	1		11	7	135	144
	Theses ...				56	51	3	4						4	4	63	59
	Jour. Articles ...	406	410	342	303	380	355	372	332	112	124	50	43	90	100	1701	1607
Surgery.	Books ...	18	27	5	23	62	63	36	29	2	4	1		16	15	135	110
	Theses ...				144	144	15	6	1					5	11	105	101
	Jour. Articles ...	894	823	844	706	597	539	513	198	180	136	23	160	145	3477	3087	
Ophthalmology.	Books ...	10	15	7	7	13	18	20	17		7	5	1	5	5	66	64
	Theses ...				41	32	1	1						2	1	44	34
	Jour. Articles ...	187	228	81	101	310	252	254	271	59	58	52	52	49	45	992	1007
Otology.	Books ...	3	9	3	1	2	7	2	6						2	12	23
	Theses ...				7	9	1							8	9		
	Jour. Articles ...	114	185	38	74	31	73	102	158	11	9	5	16	12	20	313	535
Skin Diseases.	Books ...	3	9	2	8	11	12	15	10	1	2			2	1	33	44
	Theses ...				21	24	1							1	22	22	24
	Jour. Articles ...	63	95	115	101	62	138	99	109	51	53	20	27	31	24	441	547
Venereal.	Books ...	1	2	4	4	19	13	5	6		3			6	1	35	29
	Theses ...				19	19								1	19	19	19
	Jour. Articles ...	76	72	45	31	106	96	94	56	42	31	17	22	19	32	399	348
Gynaecology.	Books ...	12	16	2	6	12	13	13	12	3	2	1		4	1	47	50
	Theses ...				40	25	3	2						1	1	44	27
	Jour. Articles ...	364	416	239	189	200	200	192	186	60	66	27	27	48	48	1130	1132
Obstetrics.	Books ...	6	7	6	8	17	16	8	18		5	1	1	7	1	45	52
	Theses ...				33	47	1	2						1	1	37	49
	Jour. Articles ...	435	430	216	195	293	211	173	142	80	55	22	30	51	57	1270	1114
Hygiene.	Books ...	62	80	29	48	39	80	29	28	3	5			2	16	4	178
	Theses ...				2	13								3	2	16	247
	Jour. Articles ...	173	239	161	237	186	271	235	202	27	26	33	30	76	56	891	1061
Jurisprudencee.	Books ...	2	2	1	1	9	18	2	4		4			1	1	15	30
	Theses ...				8	9	2	2						5	6	29	31
	Jour. Articles ...	72	167	44	103	85	173	80	160	33	46	18	28	36	49	368	726
General and Miscellaneous.	Books ...	94	96	46	52	119	144	61	64	6	6	2	2	52	13	382	377
	Theses ...				22	50	2	7						5	6	29	63
	Jour. Articles ...	349	476	200	274	488	556	393	411	99	142	94	79	176	178	1799	2116
Total by Countries.	Books ...	310	339	182	259	541	573	364	306	28	50	21	11	197	58	1643	1596
	Theses ...				677	670	42	36	1					23	40	743	746
Jour. Articles ...		4781	4904	3592	3443	4608	4380	4027	3828	1210	1164	703	685	1248	1183	20,169	19,587

